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WEAPONS AND WOUNDS.

Les armes blanches ; leur action et leurs effets vulnérants.
By H. Nimier, Professeur au Val-de-Grâce, and Ed. Laval, médecin aide-major de première classe. Pp. 448. (Paris : Félix Alcan, 1900.)

Les projectiles des armes de guerre ; leur action vulnérante. By the same authors. Pp. 212. (Paris : Félix Alcan, 1899.)

Les explosifs, les poudres, les projectiles d'exercice ; leur action et leurs effets vulnérants. By the same authors. Pp. 192. (Paris : Félix Alcan, 1899.)

THESE volumes, although their titles are formidable enough, can scarcely be said to exhaust the subject of the means invented by man for the special purpose of destroying his own race. Prof. Nimier, one of the authors, is well known as a writer on military medical subjects, and no doubt he has thought it unnecessary to repeat much of what he has already written on these and cognate subjects. The volumes, however, fill considerable gaps in our own literature. We have few writers in this country whose works stand out prominently as works of importance on the same subjects during the present century. Guthrie and Ballingall are practically the only writers whose contributions to the subject cover the period between the Peninsular and the Crimean Wars. Since then, Longmore's classical work on gunshot injuries was the sole work of reference until a year or two ago, when Stevenson, his successor in the Army Medical School at Netley, brought our knowledge of the injuries likely to be produced by modern fire-arms up to date. On the Continent the system of compulsory military service is responsible for the fact that these subjects excite widespread interest amongst the general and scientific public to a much greater extent than in England ; and many important additions have been made to the literature of wounds in war by continental writers within the last few years.

The bulkiest of these three volumes treats of a class of weapons which nowadays play a comparatively unimportant part in wars between civilised Powers—namely, the bayonet, sabre, sword, lance and arrow. This volume also contains a chapter on defensive armour. We were much disappointed in finding that its bulkiness, instead of being due to pages full of historical detail, as we had anticipated, depends largely upon needless repetitions of the diagnosis, prognosis and treatment of the wounds produced in the different regions and tissues of the human body by the various weapons included in the term *armes blanches*. These repetitions are wearisome and unnecessary. The wounds produced by side-arms differ in no way from the contused, incised, punctured or poisoned wounds described in text-books on general surgery. In other words, there is no *specialism* in the subject for the student of physical, military or medical science, except perhaps that portion of it which deals with arrows and arrow poisons.

The volume, however, is of much value as a work of reference for any one desirous of comparing the shape

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and construction of the side-arms used by the several European Powers. The chapters on the bayonet and mixed types of bayonet are specially interesting in this respect. The introduction of the magazine rifle has led to important changes in the length and weight of the bayonet and to its probable use in future wars. The short knife-bayonet is now almost universally adopted ; the shortest being the 21 centimètre long Norwegian bayonet, used with the Krag-Jörgenson rifle ; as compared with the British Lee-Metford bayonet of 30 centimètres. The Austrian, German, Italian and Spanish bayonets hold an intermediate position between these two. Russia and France, on the other hand, still retain the long, narrow-pointed bayonet. Thus the Russian bayonet, 1891 pattern, measures 43 centimètres, and the French Lebel bayonet 52 centimètres with a weight of 466 grammes. Some idea of the slender stiletto-like proportions of the latter may be formed from the fact that, although nearly twice as long, it weighs actually less than the Lee-Metford bayonet. The authors enter somewhat fully into reasons why the Russians and French prefer this long weapon of offence to the shorter bayonet, which they describe as being intended more for lopping branches of trees and digging trenches than for any other purpose in war. They agree in thinking that, in modern pitched battles, the last phase, namely, the charge, *restera à l'état purement platonique*, one side yielding to the other without waiting for cold steel. But surprises, night attacks and assaults on convoys are circumstances of war which will occur as frequently in the future as in the past ; and it is these that render the retention of the bayonet as a weapon of offence of paramount importance. The Russians recognise this fact so well that their cavalry carry a bayonet for use with the carbine. The authors also refer to the national temperament of the French as one of the reasons why they have not followed the example of neighbouring European countries in adopting a bayonet more suitable for camp purposes than as a weapon of offence. The French, they say, are specially fond of side-arms as weapons, by which we assume that the national temperament urges them to get to close quarters as soon as possible. This, however, seems scarcely sufficient reason for the preference they have for a long narrow bayonet. Our own soldiers, at any rate, have amply proved in the present campaign in South Africa that the short, stout bayonet possesses destructive and moral effects possibly equalled, but certainly not excelled, by the longer weapon. The authors have little to say that is of interest with regard to the sabre, sword and lance. The type of these weapons is practically the same in all civilised countries, and the chapters on them are mainly descriptive.

Arrows and arrow poisons are fully discussed, the chapter on them being mainly a *résumé* of the investigations made by the French naval surgeons, Le Dantec, whose tables of the geographical distribution and classification of arrow poisons are given in detail. The subject is occupying much attention at present in this country in consequence of the rapid extension of European spheres of influence in the African Hinterland, where poisoned arrows are so widely used by aboriginal tribes. Those who are interested in the subject will find accurate and important details in this chapter, but it

must be confessed that English readers have fuller historical and scientific information available on arrow poisons in the inaugural address delivered by Prof. Stockmann, of Aberdeen University, to the North British Branch of the Pharmaceutical Society in 1898 (*Pharmaceutical Journal*, November 26 and December 3, 1898). It is interesting to note how thoroughly Prof. Stockmann's ethnological distribution of arrow poisons—a distribution which is extremely well marked—agrees with that of the French writers. In their description of the methods adopted for the propulsion of arrows and similar projectiles, the authors make no mention of the use of the blowpipe, a somewhat formidable weapon in the hands of Bornean aborigines.

In the chapter on defensive armour there is a guarded reference to what may prove of considerable importance in the future. In the helmet and cuirass we still possess the relics of a period when nations fought with sword and lance; but the opinion is gradually gaining ground that the use of defensive armour in the form of shields for protection against the projectiles of modern fire-arms may become a feature in future wars. The Danish Army have already adopted a form of shield for this purpose, and the principle is also recognised in the use of shields with the quick-firing automatic guns of the Maxim type.

The authors' contribution to the subject of projectiles deals with modern fire-arms only; and, with the exception that the projectiles of the automatic guns are not considered at all, the information on the subject is concise and complete. Modern small-arm projectiles are exceptionally well described. The physical qualities of these projectiles are remarkably similar in the different European countries, the chief variation in form being in the calibre of the bullet, which is between 6·5 and 7 millimètres sectional diameter for Italy, Holland, Norway, Roumania and Spain, and between 7 and 8 millimètres for other countries, the smaller calibre of the former being compensated for by greater length. The dynamic properties, however, have considerable and important variations, which the authors describe with the lucidity and precision characteristic of French writings on subjects of this nature. The chief practical interest in the dynamics of projectiles lies in the relationship between these properties and the surgical results. The principle to which the modern small-arm projectile owes its origin is indicated in the formula $f = mv^2$. In other words, the production of a bullet with a high rate of velocity at the expense of mass has been the object attained in the adoption of magazine rifles. But it is gradually dawning upon the military mind that the equation of work, expressed by the formula $\text{O} = \frac{mv^2}{2}$, does not express accurately the relative values of velocity and mass in the surgical results. The first occasion on which our own troops used the high velocity small calibre bullet in actual war—namely, in Waziristan in 1895—proved the fallacy of the formula in this respect; and it is now fairly well recognised that the mass of the projectile is probably as important a factor in producing surgical disaster as its velocity. No doubt the actual power of penetration and the resistance required to bring the projectile to a state of rest is accurately expressed by the

formula; but it is this very power of penetration, depending so much on increase of velocity combined with reduction of mass, that has earned for the modern bullet the epithet *humane*. To pursue the subject further would lead to a variety of speculations as to the nature of the weapon of the future. The authors clearly recognise this, and are inclined to regard the action of the United States of America in reducing the diameter of the projectile of the naval small arm to 6 mm. as indicating a tendency to convert modern firearms into *carabines de salon* or *fusils d'enfants*. They are apparently much in sympathy with the use of bullets that deform or expand on impact, or at any rate produce shock, and fear that the agitation against these bullets will only lead to the use of some more deadly projectile in the future. These expanding or deforming bullets and their effects are fully described. The best known example is the soft-nosed Lee-Metford bullet, but the authors refer also to the use of the Lebel bullet with the hard envelope stripped at the apex. They state, however, that the latter does not expand on impact, although it produces shock. Another interesting example of the expanding bullet is the Swiss bullet, which has the lead core naked at the base instead of at the apex. The deformity in this bullet after impact, by the incurving of the soft base, is said to be as great as, if not greater than, the deformity at the apex of the Dum-dum type of bullet. The explosive effects sometimes caused by high velocity bullets are also very clearly discussed, but no new light is thrown upon this very curious phenomenon. The authors adhere to the generally accepted theory that the effects are due to secondary energy transmitted to tissues of a certain nature or in a certain state of tension. The possible part played by ricochets, deformities, and varying angles of impact is not mentioned in this connection. There is also entire absence of any reference to the use of true explosive bullets, which, although abolished by international agreement in 1868, are alleged to have been employed by some Boer commandos in the war that is now being waged in South Africa. The chapter on artillery fire is interesting and valuable, and concludes with a suggestive article on the moral effects of this branch of the service. In other respects the dynamics and ballistics of artillery projectiles and the wounding effects of fragments of shells, projectiles, &c., are worked out on the same lines as in the chapters on small-arm projectiles.

In the volume on explosives there is a variety of details, not readily obtained elsewhere in the same compact form, and on this account it is perhaps the most valuable of the three volumes to the student of military surgery or medical jurisprudence, to whom it is chiefly of interest. The effects of the various explosives in use are amply illustrated by historical incidents, especially incidents connected with anarchist attempts and with explosions in stores, ships and arsenals. The explosives used in the cartridges of the small-arms of different countries are also well described and compared. The authors include in this volume a chapter on the accidents connected with sapping and mining, a subject which we do not remember to have seen noticed in other works of a similar nature. The physical phenomena of a peculiar form of *intoxication* or suffocation to which sappers are

liable are fully described and not generally known in this country.

The complete absence of bibliographic references is a notable defect in the volumes, more especially as they are mainly compilations of the works of other writers and investigators, whose names appear frequently in the authors' pages. In fact the reader, who might wish to consult the original works, will have great difficulty in knowing where to look for them. We are always glad, however, to welcome any contribution to a literature which is so meagrely represented in our own country.

W. G. M.

PLANTS OF THE PAST.

Éléments de Paléobotanique, By R. Zeiller. Pp. 421. (Paris : Carré and Naud, 1900.)

SOME of the most striking advances in botanical science during the last two or three decades have been in the domain of Palæobotany. The study of fossil plants is now generally recognised as a science of primary importance, which affords, not merely useful data for the stratigraphical geologist, but furnishes valuable information as to the course of plant evolution, and enables us to connect some of the phyla of the plant-kingdom at points where their common origin is clearly indicated. Prof. Zeiller, of the École des Mines, Paris, has played a prominent part in placing fossil botany on a thoroughly scientific basis ; his work, which embraces a wide field, is characterised by a philosophical handling of facts, a thoroughness of treatment and a breadth of view that are too frequently lacking in scientific writings of the present day. In the book before us Prof. Zeiller has performed a difficult task with considerable success. Within a small compass he has included a systematic though necessarily brief account of the more important types of fossil plants, and concise and clearly-written chapters on various subjects of geological and botanical interest. The illustrations are well executed, and it is a pleasure to note that many of them are new. In the section treating of the preservation of plants as fossils, Zeiller draws attention to a method of examination of "impressions" which he has used with considerable success. It is often possible, after suitable chemical treatment, to examine microscopically the thin carbonaceous film, which may sometimes be detached from the surface of a plant fragment lying on a slab of shale, and in this way to obtain important information as to anatomical details.

Some interesting examples of the Siphonaeæ are figured and briefly described ; but one or two of the examples quoted, e.g. the supposed *Caulerpa* from the Kimmeridge Clay, are of very doubtful value. The fossil Myxomycetes of Palæozoic age, described by Renault and other authors, should be mentioned with a word of caution as to their acceptance as undoubtedly Mycetozoa. In describing the vascular cryptogams, Zeiller notes the danger of attaching too much importance to the presence or absence of secondary wood, or to the isosporous or heterosporous character of a genus ; mistakes made in the past, which have persisted for many years, emphasise the need of this caution.

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In discussing the systematic position of various extinct generic types of exceptional interest which point to a common origin of cycads and ferns, Zeiller speaks of the collateral form of the vascular bundles as one of those cycadean characters which is met with also in recent ferns. It is, however, important to bear in mind the fact that in the collateral bundles of *Ophioglossum* and other ferns the protoxylem occupies an endarch position, while the cycadean type of bundle is usually mesarch.

The chapter on fossil ferns is particularly well done, and contains much that is new. The genus *Microdictyon*, mentioned by Zeiller as a mesozoic fern closely allied to *Laccopteris*, is hardly sufficiently distinct to be retained as a separate type.

The enlarged photograph of a leaflet of the well-known "fern," *Alethopteris Serlii*, given to illustrate the occurrence of what may possibly be traces of sporangia, does not afford satisfactory evidence that this fern-like frond bore fern-like sporangia. We are still in want of convincing evidence as to the nature of the reproductive organs of both *Alethopteris* and *Neuropteris*, genera in which the characters of ferns and cycads were combined.

A drawing is given of an exceptionally fine example of a rhaetic fern—*Clathropteris platyphylla*—from Tonkin ; as Zeiller has shown, this plant may be compared with the recent genus *Dipteris*, which, like *Matonia pectinata*, represents a tropical survival of a widely-spread mesozoic family of ferns. The inclusion of the genus *Sagenopteris* with the Hydropterideæ, rather than with the Filices, is perhaps a little rash, as the evidence so far available as to the reproductive organs is by no means conclusive.

A good description is given of the genus *Sphenophyllum*, but it is to be regretted that exigencies of space prevent full justice being done in this and other cases to the account of anatomical features. Zeiller discusses the possibility of *Sphenophyllum* having lived as a water-plant in the Coal period forests, but it is perhaps more probable that its long and slender stems were supported, like lianas, by the boughs of stouter trees.

In dealing with the Calamarieæ, Zeiller does full justice to the work of English authors, and discusses controversial points with admirable judgment and an open mind. The genus *Sigillaria* is described as a true lycopodiaceous plant, agreeing in certain respects with *Isoëtes*.

In the account of fossil cycads, Zeiller, like other authors, quotes an example of a cretaceous *Cycas carpophyll*, figured by Heer, from Greenland ; the figured specimen, which the writer has seen in the Copenhagen Museum, is not sufficiently well preserved to be determined with certainty, and bears but a distant resemblance to Heer's figure. The genus *Podozamites*, placed by Zeiller among the Cycads, may possibly be more correctly included in the Coniferæ, but it is a type of somewhat doubtful position. The flowers of *Zamites gigas*, usually known as *Williamsonia*, mentioned in the section dealing with the Bennettiteæ, are usually of Inferior Oolite rather than Lower Lias age.

Prof. Zeiller gives a useful summary illustrating our knowledge of fossil angiosperms ; as he points out, the literature on Tertiary plants is in urgent need of revision